United States Patent Office

3,317,303

Patented May 2, 1967

3,317,303

TRACTION ROLLS AND MATERIAL HANDLING APPARATUS EMPLOYING SUCH ROLLS

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Filed Feb. 15, 1965, Ser. No. 432,518
8 Claims. (Cl. 65—253)

ABSTRACT OF THE DISCLOSURE

The invention relates to traction rolls capable of use in material handling apparatus especially adapted for operation at elevated temperatures; equipment for forming flat glass from a molten bath of glass being typical thereof. The life of these rolls is prolonged by incorporating in the fibrous surfaces thereof at least about 30 percent by weight of an asbestos of the group anthophyllite, amosite, tremolite, actinolite and mixtures thereof.

This application is a continuation-in-part of my application Ser. No. 372,272, filed June 3, 1964, which is in turn a continuation-in-part of my application, Ser. No. 330,202, filed Dec. 12, 1963, both now abandoned and entitled "Traction Rolls."

This invention relates to a novel method of supporting, handling and/or recovering glass in sheet or ribbon form and to novel apparatus for performing such process. It may be applied effectively to the so-called "Pennvernon" process of drawing sheet or window glass. A marked increase in glass quality is observed when it is applied in the proper way to the "Float" process of producing glass, a process wherein glass is deposited in molten state on a pool of molten metal, such as tin, and then is formed into a ribbon or is treated to improve the surface of a preformed ribbon by contact with molten tin. Pilkington U.S. Patent No. 3,083,551 describes a typical float glass process. The invention is especially applicable to supporting, handling and/or receiving glass while the glass is at a deformation temperature, i.e., a temperature at which it will deform or be subject to a marking deformation by contact with solid elements, generally about 900° F. and perhaps as high as 1600° F. or above. However, the invention is applicable to supporting, handling and/or conveying glass at lower temperatures as well.

The invention will first be described with respect to the Pittsburgh or Pennvernon sheet glass drawing apparatus in which a series of pairs of rolls provide the tractive force required to draw glass upwardly from a bath of molten glass. In some installations, there are approximately 30 pairs of drawing rolls in a drawing machine, the majority of which contact the surfaces of the glass. The lowermost 3 or 4 sets of rolls generally engage the glass only at the start of the process or when the ribbon or sheet is initially being formed and thereafter are held from engagement with the sheet because they would mar the hot glass surfaces by contact therewith. Typical drawing machines are illustrated by United States Patents Nos. 1,598,730 and 2,215,231.

Rolls of the same type can also be used in the Fourcault sheet glass drawing apparatus, or in any apparatus for contacting hot glass where their properties might be

useful or desirable. Typical rolls are illustrated in United States Patents Nos. 1,930,999, 2,085,575, and 2,120,435.

The usual rolls used in the Pennvernon process are constructed of a plurality of discs assembled onto a steel mandrel and compressed thereon. They are clamped by collars under high pressure, as for example, 1200 to 1500 pounds per square inch. The collars being fixed under pressure maintain the discs under pressure. The assembled rolls are then lathe turned for trueness and surface finish.

The discs from which the rolls are made are cut from boards formed of a fiber-binder mix using chrysotile asbestos, the most widely used type of asbestos. A chemical composition of chrysotile asbestos is $3MgO.2Si_2.2H_2O$. While chrysotile asbestos is the most common type of asbestos, it possesses certain drawbacks when used for rolls of the type being described, and especially those rolls subjected to elevated temperature, as for example, 1000 to 1200° F. and perhaps above. Temperatures of this magnitude are experienced by at least the lowermost sets of rolls of a drawing machine and are not uncommon in the entry portion of an annealing lehr. Generally, about one-third of the sets of the drawing rolls in the Pennvernon process are subjected to these elevated temperatures.

The first fifteen rolls in a typical float glass annealing lehr having approximately 225 rolls or more throughout its length are operated at elevated temperatures of this magnitude.

At elevated temperatures of operation as high as, for example, 1200° F., and perhaps above, i.e., to about 1600° F., and after use over a period of time, for example, approximately 24 hours, a roll constructed of chrysotile asbestos acquired a glazed surface and deteriorates thereafter, so that within a short time it is not satisfactory. The mandrel on which the discs are assembled under pressure to form the roll expands and the pressure on the discs relaxes. The discs separate from one another, and in the Pennvernon process, cullet or chips of glass produced during the capping operation, i.e., when a finite sheet is cut from the continuous ribbon at the top of the drawing machine, work into the spaces between the discs and become imbedded therein. The resulting roll contacts the glass ribbon, scratches and digs into the ribbon surface and destroys or damages the fire-finished glass surfaces.

At times, it is desirable to treat the glass in the drawing machine with SO_2 gas, as is described in United States Patent No. 1,782,169. SO_2 gas is acidic in nature and when used in a drawing machine contacts the drawing rolls and reacts with the chrysotile asbestos, generating $MgSO_4$. Thus, the roll material is decomposed.

According to this invention, it has been found that the problems encountered when the roll discs are formed of chrysotile asbestos fiber and a binder and subjected to use in the aforesaid drawing process can be virtually eliminated by incorporating within the mix from which the asbestos board is made a substantial amount, for example, at least 30 percent and preferably more than 50 percent by weight of a different type of asbestos fiber based upon the total weight of asbestos fiber therein. While anthophyllite asbestos fiber is preferred, it is also possible to incorporate amosite, tremolite, and actinolite asbestos fibers or mixtures thereof, in lieu of all or a